Organic Agriculture and Climate Challenges

How organic agriculture may help save energy

Improving energy efficiency and self-reliance is one of many principles and objectives in organic agriculture. Therefore, it should be balanced against other objectives such as improving nutrient recycling, soil fertility, animal welfare and biodiversity. In these aspects organic agriculture has an advantage and it is therefore a major challenge to improve energy use efficiency and self reliance without compromising the other objectives.
More focus seems to be needed in order to reduce dependence on fossil energy sources and combine renewable energy production with food production in organic farming.

ICROFS

Organic agriculture uses less energy per hectare mainly because of the absence of artificial fertiliser. But most farms still depend on fossil fuels. Thus, when yields are comparable to conventional or maximum 20-30 percent lower, the energy use per kg crop or milk is lower in organic farming.

A potential for energy self-reliance

There is a potential for organic farms to become energy self reliant through different renewable energy sources.

A knowledge synthesis published by ICROFS in 2008 has explored the most important aspects of energy use in Danish organic farming. It found that the main potential for energy self-reliance on organic farms was to increase energy production from biogas. There are numerous other possible solutions building either on wind or solar power supplementing the agricultural production or on biofuels produced as part of the farm system itself (i.e. rape oil, Rape Methyl Ester or energy crops for incineration).

Electricity savings on livestock farms

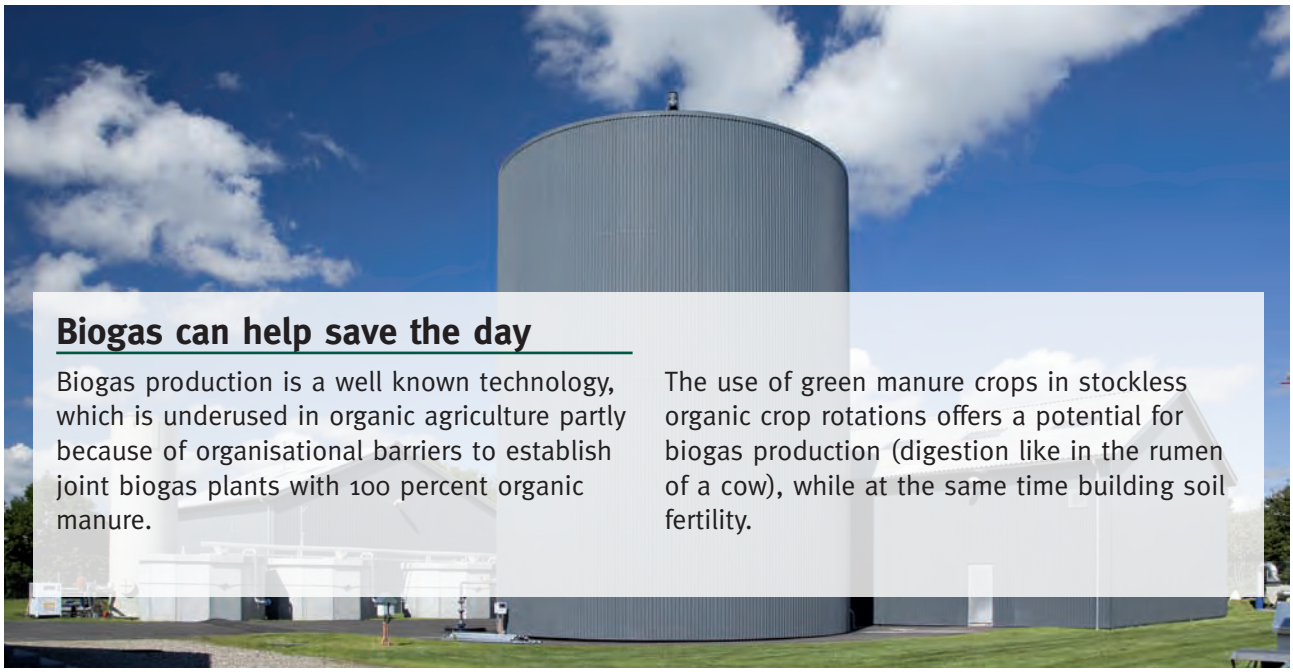
Electricity savings is a straight forward solution and many dairy farms could save more than 25% by using existing technologies.

In a recent study of 20 Danish organic farms the Danish organic advisory service found a large potential for energy savings especially as regards electricity use in dairy farms.

In some cases the reuse of heating generated from cooling of milk for cleaning equipment and stables and for heating in the house could reduce electricity by 15-20% and other significant energy savings would come from changing to low energy light sources.

Most new dairy stables are already designed to use natural ventilation rather than energy consuming mechanical ventilation.

Likewise, in organic pig production, the lower stocking density and access to outdoor runs reduces or eliminates the needs for ventilation.



Biogas can help save the day

Biogas production is a well known technology, which is underused in organic agriculture partly because of organisational barriers to establish joint biogas plants with 100 percent organic manure.

The use of green manure crops in stockless organic crop rotations offers a potential for biogas production (digestion like in the rumen of a cow), while at the same time building soil fertility.

Organic agriculture can reduce greenhouse gas discharges

From a consumer perspective, an efficient way of reducing the greenhouse gas emissions (carbon footprint) from food consumption is to replace part of the intake of meat and dairy products with plant protein and food energy not coming from glass house production.

Given that many consumers wish to consume some amount of animal products, many results indicate that organic is a good choice.

Higher soil organic matter in organic farming

Organic crop rotations often include more grass-clover and green manure crops, which build soil fertility and increase the content of soil organic matter. This binds carbon and thus reduces the net CO_2-emissions from farming.

For example, in contrast to industrialized pig production, organic outdoor sow production on grassland introduces a more diverse crop rotation with a net gain in soil carbon content. This carbon sequestration due to a diversified crop rotation is equivalent to app. 10-15% of the green house gas emissions per kg pig produced (calculated in kg CO_2 equivalents).

In agroforestry systems where trees are combined with crop production the potential for carbon binding is even higher. Diverse agroforestry systems has so far mostly been developed for humid tropics but a combination of annual and perennial crops could be a significant contribution to carbon sequestration and combined food and energy production in temperate regions.

Organics with a lower carbon footprint

The carbon footprint per kg of field grown vegetables and cereals is low compared with livestock and glass house products and organic cereals will often leave a lower carbon footprint compared with conventional.

Therefore, with the right combination of protein and energy sources and by limiting air fright it is possible to compose an organic diet with relatively low carbon footprint.

Organic products is a strong choice

The organic sector should decide to engage seriously in a development towards energy self reliance and crop rotations with carbon sequestration, without increasing the N_2O emissions. Moreover, all organic farms should develop climate-plans for reducing their dependence on fossil fuels and reduce greenhouse gas emissions.

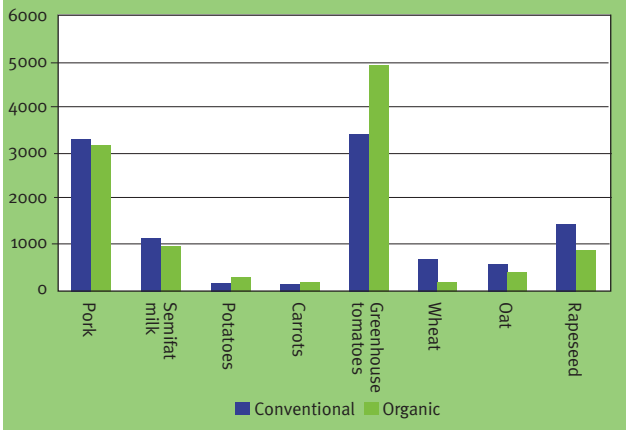
Less greenhouse gasses from organic dairy milk production

Analyses based on life cycle assessment (farm to table analyses), have shown that organic dairy production in Denmark discharges about 10 percent less greenhouse gasses per kg milk compared to similar conventional production. In other countries the organic dairy production leads to similar or slightly higher emissions per kg milk compared to conventional production.

Greenhouse gas emissions from food production

As illustrated in figure 1, the difference between the different food items is larger than the difference between organic and conventional production of a given food.

Figure 1: Emission of greenhouse gasses per kg product for selected organic and conventional foods.



More reading

International Trade Centre, UNCTAD/WTO (2007). *Organic Farming and Climate Change*. Geneva: International Trade Centre, UNCTAD/WTO, cf. pp. 13 and 17.

Niggli, Urs, et al. (2008). *Technology Platform 'Organics': Vision for an Organic Food and Farming Research Agenda to 2025*. Cf. p. 19. Link: www.tporganics.eu.

Klöble, U. (2008). *Klimawandel und Ökolandbau: Situation, Anpassungsstrategien und Forschungsbedarf.* Darmstadt: KTBL

Halberg, Niels (2008) *Energy use and Green house gas emission in organic agriculture.* IN Organic agriculture and climate change. Centre National de Ressources en Agriculture Biologique.

Knowledge synthesis

ICROFS has coordinated a research based fact finding work on how to secure the future of organics in Denmark. The knowledge synthesis was commissioned by the Danish Ministry of Food.

Read the White paper of the synthesis with summary of results and recommendations: www.icrofs.org/pdf/knowledge_synthesis.pdf (pp. 42-45).

Organic Eprints

The open archive database includes vast amounts of information, articles and research results on organic food and health. Visit www.orgprints.org

About ICROFS

The International Centre for Research in Organic Food Systems (ICROFS) is a "centre without walls" where the research is performed in interdisciplinary collaboration between research groups in different institutions. The centre is an expansion of the former research centre DARCOF, which the Danish Government in 2008 decided to give an international mandate and an international board.

The main purpose of ICROFS is to coordinate and monitor international research in organic food and farming systems in order to achieve optimum benefit from the allocated resources. Further, the aim of ICROFS is to initiate research and create impact of the research results through support and dissemination of high quality research of international standard.

More information at www.icrofs.org

ICROFS